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World Economic and Social Survey 2009: Promoting Development, Saving the Planet

Overview**

Summary

Securing an effective response to the threat of climate change requires policymakers at the global and national levels to adopt a fully integrated development perspective. Such a response will demand drastic reductions of greenhouse gas emissions in developed countries, but it will need to go beyond this. An expanded public policy agenda, including targeted industrial policies, is necessary to promote a push to low-emissions, high-growth development pathways and to ensure greater adaptive resilience with respect to climatic changes that cannot now be avoided.

Large-scale public investments in, inter alia, renewable energy, transportation and water supply will be needed to shift to a new pathway, particularly in its early stages. To enable developing countries to take part in and contribute to such a transition, massive transfers of financial resources from the world's richest countries, along with new agreements to facilitate the necessary transfer of new technologies to developing countries, will be required. These transfers can help propel catch-up growth, allowing a much greater role, over the longer run, for domestic resource mobilization in consolidating the new development pathway.

* E/2009/100.

** The document was submitted late owing to the delayed receipt of some critical inputs.

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Addressing climate change is the concern of all

The central message of the *World Economic and Social Survey 2009* is that addressing the climate challenge requires much stronger efforts by advanced countries to cut their emissions, along with the active participation of developing countries. Such participation can occur only if it allows economic growth and development to proceed in a rapid but sustainable manner. The *Survey* argues that switching to low-emissions, high-growth pathways in order to meet the development and climate challenges is both necessary and feasible. It is necessary because combating global warming cannot be achieved without emissions reductions from developing countries. It is feasible because technological solutions that can enable a shift towards such pathways do in fact exist.

Most developing countries do not currently have the financial resources, technological know-how and institutional capacity to deploy these solutions at a speed commensurate with the urgency of the climate challenge. Failure to honour long-standing commitments of international support in these three areas remains the single biggest obstacle to meeting this challenge.

The *Survey* also argues that, in line with common but differentiated responsibilities, the switch will require an approach to climate policy in developing countries different from that in developed ones. It will, in particular, require an active Government role through public investment and industrial policies that guide the transformation towards a sustainable development process. Such a role will be central in confronting both the mitigation and the adaptation challenges presented by dangerous climate change. In contrast, the mix of measures in developed countries is likely to entail a larger role for carbon markets and stronger regulation.

Finally, issues of trust and justice will need to be taken much more seriously so as to ensure fair and inclusive responses to the climate challenge. The *Survey* argues that one determinant of success will be the capacity of developed and developing countries to create a more integrated framework and joint programmes with shared goals on, inter alia, climate adaptation, forestry, energy (including energy access), and poverty eradication, rather than an independent or conditional partnership.

Projections and principles

The climate challenge for developing countries

Even if the annual flow of emissions were to stabilize at today's level, the stock of greenhouse gas emissions in the atmosphere would be twice the pre-industrial level by 2050, entailing a high probability of dangerous temperature rises, with potentially destabilizing economic and political consequences. The latest findings of the Intergovernmental Panel on Climate Change (IPCC) suggest the following:

> For many key parameters, the climate is already moving beyond the patterns of natural variability within which our society and economy have developed and thrived. These parameters include global mean surface temperature, sea-level rise, ocean and ice-sheet dynamics, ocean acidification, and extreme climatic

events. There is a significant risk that many of the trends will accelerate, leading to an increasing risk of abrupt or irreversible climatic shifts.[1]

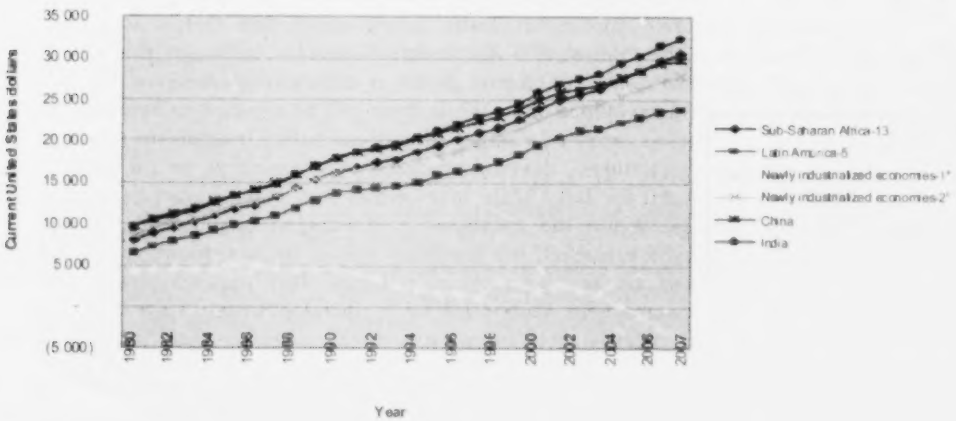
In light of these findings, the survey recognizes a maximum temperature increase of 2° C above pre-industrial levels as the target for stabilizing carbon concentrations at a level that prevents dangerous anthropogenic interference in the climate system. This corresponds to a target greenhouse gas concentration (in terms of carbon dioxide equivalents (CO_2)) of between 350 and 450 parts per million (ppm) and to global emission reductions of the order of 50-80 per cent, by 2050. In terms of actual emissions, this would be equivalent to a reduction from roughly 40 billion gigatons of carbon dioxide ($GtCO_2$) at present to between 8 billion and 20 billion $GtCO_2$ by 2050.[2]

This challenge is the consequence of over two centuries of unprecedented growth and rising living standards, fuelled by an ever increasing quantity and quality of energy services. Traditional (biomass) energy sources were initially replaced by coal and (beginning in the early 1900s) by oil. Today, fossil energy sources provide for some 80 per cent of total energy needs.

However, the activities that utilize these services have been very unevenly distributed, resulting in a sharp divergence of incomes between the developed and the developing world and huge economic and social disparities globally (figure I). Moreover, as a result of this uneven development, the advanced countries have, since 1950, contributed as much as three quarters of the increase in emissions despite the fact that they account for less than 15 per cent of the world's population.

Figure I

The income gap between G7 and selected regions, 1980-2007



Source: *World Economic and Social Survey 2009: Promoting Development, Saving the Planet* (United Nations publication, Sales No. E.09.II.C.1), forthcoming.

[a] First tier: Hong Kong, Special Administrative Region of China; Republic of Korea; Singapore; Taiwan Province of China.

[b] Second tier: Indonesia, Malaysia, Philippines, Thailand.

[1] Key message (climatic trends) from the International Scientific Congress Climate Change: Global Risks, Challenges and Decisions, Copenhagen, 10-12 March 2009.

[2] A gigaton is equal to 1 billion metric tons.

It follows that the response to climate change in developing countries will necessarily unfold in the face of vastly more daunting challenges than those confronting developed countries and in a far more constrained environment. The major challenge remains that of economic growth. Economic growth is important not only for achieving poverty eradication but also for bringing about a gradual narrowing of the huge income differentials between the two groups of countries. The idea of freezing the current level of global inequality over a century or more (as the world goes about trying to solve the climate problem) is as ethically unacceptable as it would be politically destabilizing.

Synergies between the climate and development challenges

Is it possible to combine high economic growth in developing countries with a radical lowering of the emissions trajectory? The literature on climate and development encompasses two different approaches to this issue. Proponents of the "top-down" approach focus on the global challenge and what kind of emissions trajectories for developing countries would be consistent with meeting this challenge. The "top-down" approach has also been used to calculate representative costs of climate action. Proponents of the alternative, "bottom-up" approach focus on the concrete actions that are being undertaken by developing countries in the context, for example, of energy efficiency targets, pilot programmes in renewable energy, afforestation projects and Clean Development Mechanism (CDM) projects. The "bottom-up" approach has also been used to develop cost estimates of specific mitigation options. However, there are very few studies that translate both these approaches into the kind of strategic programmes that would put the economy on a sustainable development trajectory.

Combining the two approaches leads to the conclusion that it is indeed possible to integrate the climate and development agendas, although this would require a very different stance on climate policy in developing countries than the one that has emerged in developed ones. While there will be similarities between the two groups of countries in terms of a subset of national policy instruments (smarter incentives, stronger regulations), developing-country Governments would need to steer resources mobilized for large-scale investments into new production sectors and new technologies. While the emphasis in developed countries is on the development of the carbon market, the preferred option for developing countries should be an emphasis on active industrial policies. This requires strong and sustained political commitment embodied by a developmental State and, as critically, sizeable and effective multilateral support with respect to both finance and technology.

Synergies between developed- and developing-country actions

The search for synergies between developed and developing countries in respect of climate action has led to three rather different approaches. Application of the first approach means that developing countries follow the example of developed countries, either voluntarily or through some form of coercion, by adopting emissions reduction targets. Under the second option, either setting targets or undertaking actions is conditional on the availability of finance and technology from

developed countries. Under the third option, developed and developing countries jointly adopt both climate and development targets.

The *Survey*'s conclusion is that the first approach is bound to fail. The second approach is a necessary one, but it runs the risk of producing only incremental action on a project-by-project basis. Quite understandably, this approach has focused attention on the question of financial transfers through official development assistance (ODA). If ambitions with respect to meeting the climate challenge were more modest, this approach would suffice; given, however, the scientific consensus on the dangers of climate change, it is most likely inadequate. It is the third approach that is in fact best suited for reconfiguring the development trajectory. As it turns out, the recent multiplicity of food, energy and financial crises may have created just the context in which such cooperative action could take root. While the origins of those crises may be distinct, like the climate crisis they pose a common threat to actions still to be completed under the agenda for achieving economic development and poverty eradication.

In response to the global economic and financial crisis, steps have been taken to bring about recovery, to prevent a return to the financial excesses of "casino capitalism" and, through the inclusion of green investments in stimulus packages, to address environmental concerns, including those pertaining to climate change. While these initiatives do not yet add up to a long-term sustainable solution, they do point in the right direction. Still, much more needs to be done. There has been, in particular, a reluctance to acknowledge both the scale of the adjustments that developing countries will be required to make to pull their economies out of the global recession and shift onto low-carbon pathways, and the resulting economic and political costs. If developing countries are to undertake such adjustments, a much greater level of international cooperation will be needed.

Burden-sharing

The climate crisis is the result of the very uneven pattern of economic development that evolved over the past two centuries, which allowed today's rich countries to attain their current levels of income, in part through not having to account for the environmental damage now threatening the lives and livelihoods of others. Indeed, it has been estimated that for every 1° C rise in average global temperatures, annual average growth in poor countries could drop by 2-3 percentage points, with no change in the growth performance of rich countries. It is even possible that the advanced countries will actually benefit from temperature rises in the medium term thanks to improved agricultural yields (due to carbon fertilization) and lower transportation costs (across ice-free arctic shipping routes).

Working these considerations into a consistent climate framework has proved a difficult task. Since the United Nations Conference on Environment and Development, held in Rio de Janeiro in 1992, it has been agreed that countries have "common but differentiated responsibilities" for dealing with the climate challenge. (The principle was restated at the thirteenth session of the Conference of the Parties to the United Nations Framework Convention on Climate Change,[3] held in Bali, Indonesia, in December 2007.) It has been difficult to reach a consensus on what

[3] United Nations, *Treaty Series*, vol. 1771, No. 30822.

this means in practice, however, because rich countries do not want to give too much significance to past actions that would place the bulk of the responsibilities on their shoulders, while developing countries fear, for the same reason, giving too much importance to current and future emissions.

Correcting a market failure ...

A breakthrough of sorts occurred with the Stern Report released in late 2006 by the Government of the United Kingdom of Great Britain and Northern Ireland, which identified greenhouse gas emissions as "the greatest market failure the world has ever seen" and provided the first serious attempt to model the cost of doing nothing in comparison with the cost of adopting an alternative strategy which would hold emissions below a manageable threshold. From this perspective, a form of climate ethics emerges around the need to realign social and private cost by making the polluters pay for the damage they inflict on others. The Stern Report concluded that it was possible to ensure that future generations would be much better off at relatively little cost to present generations.

Stern's analysis has triggered a heated debate among economists about the right methodology for costing climate damage and the most efficient mechanisms for correcting the underlying market failure. That debate has encouraged policymakers to think more clearly about the management of climate risk under conditions of imperfect information and uncertainty, and to develop a sense of both historical consideration (regarding how far back the polluter-pays principle should reach) and geographical ones (regarding whether the polluter is the producer or the consumer of the goods that add to the stock of greenhouse gas emissions).

The resulting "top-down" metrics have generated complicated country schedules for bringing carbon emissions down to sustainable levels. So far, however, this approach has provided surprisingly little policy guidance on how countries might manage transformative change, with discussion in this regard being limited to the subjects of the distribution of emission rights and the determination of the right price for carbon.

Creating a global carbon market and establishing a predictable carbon price will be part of the policy mix, but they do not address the development dimension of the challenge. The cap-and-trade system has been designed to conform to the policy experience, institutional capacity and economic conditions of rich countries. By default, this provides significant advantages to them, as the essential baseline is the current emissions of the high-emitting countries.

... or promoting development rights

Others have argued that the economists' focus on market failure is overly reliant on cost-benefit calculations and thereby underestimates the threat of catastrophic climate shocks and understates the plight of the most vulnerable communities. The rural poor in the developing world will likely face the largest adjustments to climate change and helping them meet their adaptation challenge should be an essential feature of a fair climate framework.

However, divergent growth and rising global inequality over the past 60 years make the development policy challenge into something much bigger than that of

eliminating extreme poverty.[4] Moreover, over that period, advanced countries, in their climb to the top of the development ladder, have used up a good part of the atmospheric space for greenhouse gas emissions. Given the close link between energy use and economic growth, there is a real concern that the sustainable development ladder has already been kicked away and with it any real chance of combining climate and development goals.

A possible framework based on the idea of "greenhouse development rights" combines a measure of responsibility and ability to pay as a possible basis for sharing the burden of climate change that is consistent with the scale and urgency of the climate challenge as well as development objectives. This would be realized essentially by establishing the right to be exempt from sharing the burden of climate protection up to a given world average income of $9,000 (purchasing power parity (ppp)). This figure is above the current global average and represents a threshold consistent with the situation of more diversified economies and beyond which further income increases have little effect on human development indicators. Individual citizens above that income threshold in a country whose average income fell below it would be expected, however, to share in meeting that burden. In essence, this makes the capacity to pay similar to that determined by an income tax with a personal exemption of $9,000.

While the threshold is not predetermined, on any realistic calculation, developed countries will assume a much more significant share of the global costs of climate protection, while developing countries will assume only more responsibilities in line with their level of development. It is possible that some arrangement along these lines will eventually emerge from discussions on common but differentiated responsibilities. On the other hand, this approach tends to avoid discussing the specifics of policy design in moving towards low-carbon, high-growth development pathways and the kinds of international mechanisms needed to effect such a transition.

Greening catch-up growth

Policies designed to deal with the threat of dangerous climate change are lagging far behind the scientific evidence. At the same time, existing international commitments have fallen well short of promises and progress on new commitments is moving slowly. This represents a dangerous impasse as developing countries strive to accelerate growth through industrial development and rapid urbanization. The only way to make tangible progress is to approach the climate challenge as a development challenge.

An investment-led approach

All economic success stories have enjoyed a sustained burst of growth, on the order of 6-8 per cent per annum, allowing them to raise living standards and close the income gap with the developed countries. Growth, moreover, is strongly correlated with a broad set of social indicators, including poverty reduction, which

[4] *World Economic and Social Survey 2006: Diverging Growth and Development* (United Nations publication, Sales No. E.06.II.C.1).

together describe a more sustainable and inclusive development path. But this path does not emerge spontaneously. Even after a period of rapid growth, countries can get stuck or even fall back. Others struggle just to take off.

A rapid pace of capital accumulation, accompanied by shifts in the structure of economic activity towards industry, is usually a critical factor behind a sustained acceleration of growth. A good deal of early development policy analysis was focused on raising the share of investment to a level that would trigger a virtuous circle of rising productivity, increasing wages, technological upgrading and social improvements. The successful version of this "big push" concentrated on selective leading sectors whose development would attract a further round of investment through the expansion of strong backward and forward linkages. As described, the development policy challenge was less about detailed planning and more about strategic support and coordination, including a significant role for public investment in triggering growth and crowding in private investment along a new development path.

In the 1980s and 1990s, investment-led development models had been abandoned in favour of market-oriented economic reforms. However, for most developing countries, freer markets and greater exposure to global competition did not produce the outcomes expected by the proponents of those reforms, particularly with respect to investment performance and economic diversification.

A return to an investment-led approach in developing countries makes sense once the climate challenge is linked with the need to meet the demands of an industrializing and urbanizing population. Such an approach has already begun to take shape in richer countries with the inclusion of green investments in stimulus packages designed to create jobs in the face of a severe economic downturn. For developing countries where the shift to new sources of energy must take place in the context of their need to strengthen food production and diversify into competitive industrialization, the challenge is of an even larger magnitude.

The mitigation challenge

Reducing greenhouse gas emissions will require large and interconnected investments across several sectors, with the aim, inter alia, of halting deforestation and land degradation, retrofitting buildings to make them more energy-efficient and redesigning transportation systems. But it is an energy transition that will be at the core of an alternative integrated strategy for meeting climate change and development goals. As the energy-related sectors account for almost two thirds of total emissions, the ultimate goal of such a transition must be to improve energy efficiency and reduce reliance on fossil fuels, especially oil and coal, and to increase reliance on renewable sources of energy, especially wind, solar and advanced (non-food) biofuels.

Developed countries have mature economies, in which there is adequate (and even excessive) availability of modern energy services. They do not need to undertake a massive expansion of their energy infrastructure, although lifestyle changes and sizeable investments will still be needed to turn their energy system away from the current dependence on fossil energy towards a complete decarbonization by the end of the century, or earlier. Developing countries, on the other hand, are severely handicapped in terms of modern energy infrastructure, and

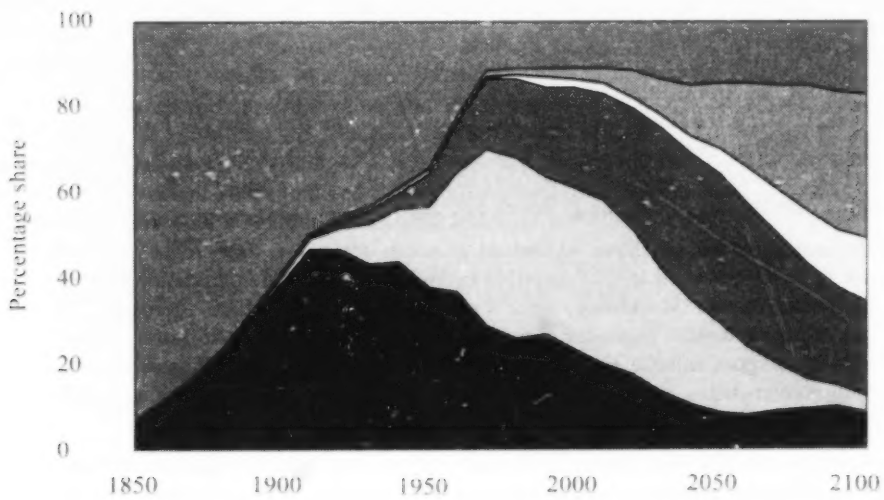
will require sustained investments in this sector to meet existing demand and promote economic development.

It follows from this that developed economies may need, and will be able to afford, a substantial increase in the price of energy, especially fossil-based energy, in order to provide the right market signal to potential consumers and investors. In contrast, all developing countries face the urgent challenge of expanding the energy infrastructure and making energy services widely available at affordable prices. The estimated number of people lacking such access ranges between 1.6 billion and 2 billion, mainly in rural areas. At least for the foreseeable future, developing countries will need to subsidize energy for their middle- and lower-income groups in order to make these services affordable.

Connecting those people to energy services will cost an estimated $25 billion per year over the next 20 years. This is a large sum for the poorest of the developing countries and is several times larger than the amount of aid spent on energy services; but given that energy use is responsible for over three quarters of total greenhouse gas emissions, all stabilization scenarios indicate that a huge share of emissions reductions, perhaps as much as 80 per cent, will have to come from the reshaping of energy systems. Figure II depicts the historical evolution of the energy system and one possible future development path towards decarbonization, one that would limit the increase in global average temperatures to about 2° C by the end of the century. The figure illustrates the much-needed transformational change of the global energy system.

Figure II

Historical evolution of, and a possible future for, the global energy system, in the context of the relative shares of the most important energy sources, 1850-2100



Source: World Economic and Social Survey, 2009: Promoting Development, Saving the Planet (United Nations publication, Sales No. E.09.II.C.1), forthcoming.

A range of technological options will be relevant to the mitigation challenge, from the diffusion of existing low-carbon technologies, through the scaling up of new commercial technologies, to the development and diffusion of breakthrough technologies. Some of these will be cost-saving immediately or over a short timespan. However, the production of larger amounts of clean energy in line with industrial and urban development will require very large investment with a long gestation period.

To realize scale economies and the potential benefits of technological learning, "upfront" investments would need to be made in new and advanced carbon-saving technologies, which would, after scale-up and adoption, lower the mitigation costs and increase the mitigation potentials. Complementary investments in research and development and related skills development would also be needed to improve the performance of carbon-saving technologies and reduce their costs.

The potential size of the energy market in developing countries along with the possibility of making improvements to already installed capacity serves as an indication of how important investment opportunities could be. However, as the initial costs and risks are likely to deter private investors, the public sector would be left with a leading role, at least in the early stages of expansion. The current investments in the global energy system are estimated at some $500 billion per year. The sustainable scenario depicted in figure III would require at least twice this effort during the coming decades — about 1 trillion per year or $20 trillion by 2030.

Resilience through diversity: the adaptation challenge

For many developing countries, environmental constraints and shocks are already part of a vicious development cycle which traps them at a low level of income, undermines their resource base and constrains their capacity to build resilience with respect to future shocks. Even if policymakers can quickly effect the transition to a low-carbon growth path, unavoidable rising global temperatures will bring serious environmental shocks and stresses, through spreading drought conditions, a rising sea level, ice-sheet and snow-cover melting, and the occurrence of extreme weather events. In the coming decades, these phenomena will threaten and destroy livelihoods around the globe, in particular the livelihoods of already vulnerable populations, including in developed countries.

Humanitarian groups have expressed concern for some time regarding the potential linkages between low or negative economic growth rates, higher levels of unemployment in the workforce, and stressed land and marine ecologies. A changing climate would engender, in already fragile contexts, additional stress factors such as more intense hurricanes in the Caribbean, above-average warming impacting glacier-dependent river flows in Central Asia, and drought-induced water scarcity impacting the fragile economies of Northern Africa.

Adapting to climate change will have to be a central component of any comprehensive and inclusive climate agenda. Poor health of populations, lack of infrastructure, weakly diversified economies, missing institutions and soft governance structures expose poorer countries and communities not just to potentially catastrophic large-scale disasters but also to a more permanent state of economic stress from higher average temperatures, reduced water sources, more frequent flooding and intensified windstorms.

Those threats are particularly common in rural communities where more than one third of households globally must confront the precariousness of their livelihoods. In sub-Saharan Africa, that proportion is over 60 per cent, and in some areas, heat-related plant stresses will contribute to reduced yields in key crops, by as much as 50 per cent. Strategies to decrease crop failures will include diversity farming, which is potentially one of the most important strategies for achieving food security in a changing climate, and the utilization of new crop strains that are more weather-resistant and have higher yields. More generally, economic policies to promote agricultural development should focus on extending support services, particularly for smallholders, and improving infrastructure (such as roads and storage facilities along with irrigation networks).

Forests are a source of livelihoods for close to 25 per cent of the world's peoples, many of whom are under threat from climate change. Important elements of forest protection encompass not only improved climate forecasting and disease surveillance systems but also strategies for preventing and combating forest fires, including the construction of fire lines, controlled burning and the utilization of drought- and fire-resistant tree species, such as teak, in tropical forest plantations. Measures aimed at assisting forests in adapting to climate change encompass, for instance, facilitating the adaptive capacity of tree species mainly by maximizing silvicultural genetic variation, and also management approaches such as reduced-impact logging. More generally, investments in economic diversification and employment creation, as well as improvement of land, soil and water management, will be part of a more integrated strategy.

The impacts of a changing climate on health and sanitation will be just as significant. While warming has already contributed to an additional 150,000 deaths annually in low-income countries, higher temperatures will further increase the survival and replication rates of bacterial contaminants of food and water sources, exacerbating the impact on health. Further, increased water scarcity will worsen already inadequate sanitation and hygiene standards which have led to more than 1 million deaths each year. In many cases, water management is made all the more difficult by the variability in water availability, a consequence of both population increases and a changing climate, a situation that requires increased resilience in water management systems. Although efforts are already under way to strengthen those systems in a number of developing countries, significant public investment will be needed to achieve sustainable results.

More than half of the world's population now live in urban areas. City dwellers are expected to make up three quarters of the world's population by 2050, with almost all the growth in the developing world. Urban environments face their own adaptation problems, linked, in particular, to the quality of social infrastructure and building. In rapidly expanding coastal cities, for example, protection against sea-level rises and increased wind strength is an urgent priority. In developing countries, where urbanization is expanding at a particularly rapid pace, a combination of poverty, population density and poor social services makes for particularly vulnerable communities for which sudden climatic shocks can prove devastating. As things currently stand, most of the risk to urban areas is associated with the incapacity of local governments to, inter alia, ensure the development and protection of infrastructure and the adequacy of disaster risk reduction and disaster preparedness.

Combined large-scale investments, information management and collective action have already been undertaken by countries and communities with advanced economies that are vulnerable to the threat of climatic shocks. For many developing countries, however, the core of adaptation is still closely tied to the need to diversify their economies away from reliance on a small number of activities, particularly those in the primary sector that are sensitive to climatic shocks and changes. The Government of Mozambique, for example, has drawn up ambitious plans for the sustainable development of the coastal region, including infrastructure (transportation, drainage and water supply), land-use changes, and soft options to manage beach erosion. Such plans, which present unique opportunities for an infusion of massive development projects, need to deal with climate risks in an integrated manner, across seasonal, inter-annual and multi-decadal time scales. A combination of public investment, cheap credit and access to appropriate technology will be essential to meeting the adaptation challenge.

Towards an integrated agenda

Though the number of calls for a mainstreaming of climate policy is growing, the response cannot be one of grafting adaptation and mitigation goals onto the objectives of development policy that are currently being discussed. Rather, the two big challenges of development and climate change have to be connected through the long-term management of economic and natural resources in a more inclusive and sustainable manner.

This should be viewed not as a quick — and certainly not as a costless — fix but rather as a multidimensional task in which large and long-term investments will play a pivotal role in enabling economies, at all levels of development, to switch to low-carbon, high-growth pathways. Policymakers will need to confront historical legacies, contemplate alternative economic strategies and embrace a more collaborative political discourse. Moreover, they will have to do so as the world tries to recover from the biggest economic shock since the Great Depression.

The current shocks and the resulting crisis have provided an opportunity for fresh thinking about the public policy agenda, and have served as a reminder that Governments are the only agents capable of mobilizing the massive financial and political resources required to confront large systemic threats. Large-scale resource mobilization will certainly be needed at both the national and the global levels in order to achieve combined climate and development goals. The big policy challenge lies in ensuring that these investments trigger more virtuous growth circles, through which to crowd in private investment and initiate cumulative technological changes in dynamic growth sectors, thereby supporting economic diversification and creating employment opportunities.

Public policy challenges

The big push towards cleaner, more diversified and more resilient economies will be supported or hindered by Government policies. Because many of the required investments will be large and complementary, price signals and regulatory structures, including building codes, fuel efficiency standards and mandates for renewable energy use, need to be predictable. In the face of the initial cost

disadvantages, the adoption of new cleaner technologies through Government subsidies, feed-in tariffs and other support measures, can be facilitative.

Some developing countries have begun to develop alternative policy frameworks, through, for example, national adaptation plans. These have focused on climate-proofing infrastructure projects, such as transport and irrigation systems, improved disaster monitoring and management and better land-use planning; but difficulties in scaling up projects, because of funding and institutional shortcomings, as well as the failure to adopt a more broadly developmental approach, still need to be overcome. More lasting success will depend on adopting smarter development policies which link adaptation more tightly to ongoing efforts to remove existing vulnerabilities and constraints on growth and development. Such approaches will need to use large-scale adaptation projects in both the rural and urban sectors to create jobs, achieve economic diversification and trigger faster growth.

A missing element in the current discussion — one central to achieving a more integrated approach — is industrial policy, consideration of which has been out of fashion in recent years on the grounds that "picking winners" has a long history of failure, particularly in developing countries. However, at a time when developing countries must industrialize to meet their development goals even as they strive to achieve climate goals, it is difficult to imagine an integrated approach which does not take industrial policy seriously. Stronger intellectual property rights and efforts to attract foreign direct investment (FDI) are no substitute for sound industrial policies in developing countries.

The development of new low-carbon technologies will respond to supply-push (such as targeted cheap credit) and demand-pull (such as a policy-induced price of carbon) factors. The sooner these are adopted, the faster cost savings will be linked to learning and wider diffusion. The longer the wait, the higher the required emissions reduction will be and the slower the cost buy-downs. Leapfrogging, through the import of such technologies, holds out the possibility of more vigorous improvements in energy efficiency, from supply to end use, expanded shares of renewable, more natural gas and less coal, and early deployment of carbon capture and storage.

Such transformational changes in the energy system need support from research, development and deployment (RD&D), removal of trade barriers and effective capacity-building. Centres for low-carbon technology innovation could have an important role to play. At least in the initial stages, the centres are likely to be publicly funded, though the precise details of the mix of donor, public and private funding would vary across countries and over time. What combination of basic research, field trials, business incubator services, venture capital funding, technical advice and support, and policy and market analysis is adopted will also be very much contingent on local conditions and challenges. In some cases, regional centres might represent the best way to benefit from economies of scale and scope.

A New Deal?

Those organizing a more integrated policy approach to the development and climate challenges could certainly learn from the experience connected with introducing the New Deal policies in the United States of America in response to the Depression of the 1930s. In particular, the interconnected investments in energy,

transportation, agriculture and health laid the foundations not only for a return to full employment but also for a strong industrial take-off in some of the most underdeveloped parts of the United States, crowding substantial private investment into new sources of job creation.

Since 1945, successful developing countries have also used a mixture of market incentives and strong State interventions to generate rapid growth and structural changes. Such support was often guided by an encompassing development vision that judged policy interventions in terms of their contribution to diversifying economic activity, creating jobs and reducing poverty.

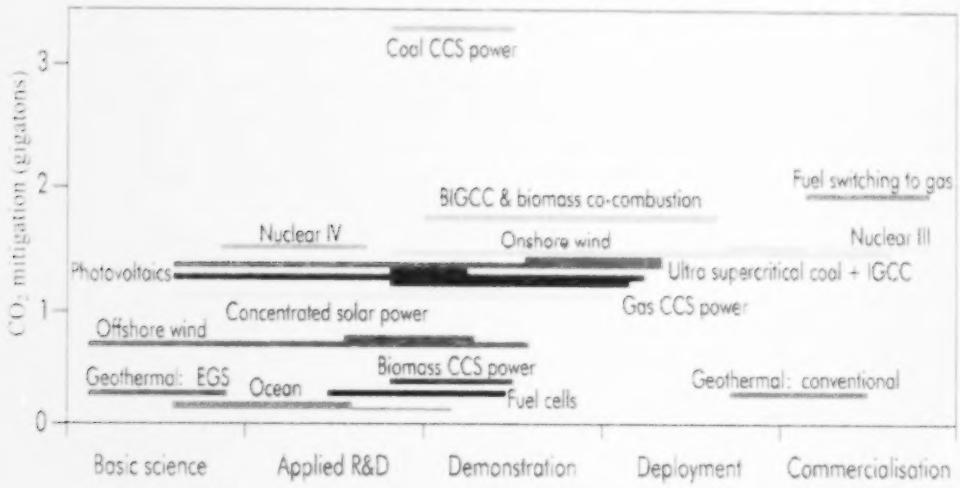
By contrast, many developing countries have suffered from a rollback of the role of the State during the lost decade of the 1980s. As a result, the ability of the public sector to provide effective and innovative leadership in such a complex area as climate change is severely strained. Those countries will need support in rebuilding the State infrastructure in order to be able to discharge the additional responsibilities attendant upon achieving the objectives of the climate agenda. This focus on the strengthening of the public sector is in sharp contrast to the approach of developed countries, where the climate agenda has been focused on the development and strengthening of the carbon market.

Required investment costs

An integrated approach entails not only finding solutions in situations involving traditional market failures but also dealing with systemic threats and managing large-scale adjustments in economic activity. The only sensible response is to mix market solutions with other mechanisms, including public investment.

It is important to see investments in both adaptation and mitigation as part of a larger shift to a new investment path involving a broad number of sectors and regions, and aimed at weakening the climate constraint on global growth. If history is any guide, industrial-scale production and distribution of cleaner energy should exhibit scale economies and trigger a range of complementary investment opportunities in different sectors of the economy. Figure III presents some of the major technologies involved and how soon they might be ready for large-scale deployment. Related investments, in many developing countries, will be needed to raise agricultural productivity, improve forest management, and ensure, along with a more reliable water supply and a more efficient transport system, the steady expansion of green jobs.

Figure III
Technology development and CO_2 mitigation for power generation



Source: *World Economic and Social Survey 2009: Promoting Development, Saving the Planet* (United Nations publication, Sales No. E.09.II.C.1), forthcoming.

Abbreviations: CCS, carbon capture and sequestration; IGCC, integrated gasification combined cycle; BIGCC, biomass integrated gasification combined cycle; EGS, enhanced geothermal systems.

In the short and medium run, however, mitigating and adapting to climate change increase the cost of development. Perhaps as much as $40 billion might be needed to make existing investments climate-proof, and the figure for ensuring resilience in the face of future developments will be much larger. The United Nations Development Programme (UNDP) has estimated that this would require $86 billion annually (by 2016) and failure to act quickly on mitigation will only add to that figure. Investment in mitigation will be of a much higher order. Estimates by McKinsey & Company, a global management consulting firm, suggest that additional investments of $270 billion-$500 billion annually by 2030 would be needed to meet stabilization targets.

Financing these investments will be among the big constraints on the shift to low-carbon economies in most developing countries, particularly where domestic markets for low-carbon technologies are small. Macroeconomic policies will need to be consistently pro-investment; and institutional reforms, including the revival, recapitalization and refocusing of development banks, will need to be adopted. However, such constraints serve as an important reminder that this time around, any "green new deal" will need to have a global dimension.

The global response

The search for sustainable alternatives that counter the threat of dangerous climate change must at the same time deal with a legacy of highly uneven economic

development and a growing level of insecurity linked to interrelated crises in the supply of food, energy, water and finance.

Towards a Global Sustainable New Deal

A Global Sustainable New Deal should seek to establish a new public policy agenda aimed at placing countries on a different developmental pathway — one that protects the natural resource base in an equitable manner without compromising job creation and catch-up growth. Such a goal can be achieved only if Governments of rich and poor countries alike come together in collaborative initiatives.

Such initiatives should follow basic principles in order to maximize their contributions to development goals. They could be pursued, in part, by using the resources mobilized by the stimulus packages of developed countries, but reform of the multilateral financial and trading systems will be needed, over the medium term, to support a more stable global economy and promote investment-led growth in a low-carbon economy. Over the longer term, that growth will be sustainable only if developing countries are able to mobilize sufficient domestic resources.

Managing the Global Sustainable New Deal

In order for the combined challenges of development and climate change to be met, nothing less than a fundamental transformation as regards financial and technological support to developing countries is needed. Such a transformation would involve moving beyond the long-standing promises of such support from developed countries and allow developing countries to shift quickly to a low-carbon, high-growth path.

What also needs to change is the intergovernmental process on climate change, whose evolution has been governed largely by principles of environmental protection. This has meant that the consideration of development has been left to other forums and institutions. A new focus on development needs to be engendered and the regime and governance mechanisms need to build appropriate linkages and processes around sustainable development at the international level, which would encompass:

(a) *An investment-based approach.* A low-carbon growth trajectory will not be created through prudent macroeconomic policies and rapid market liberalization. Instead, massive investments (from the public and private sectors) in new infrastructure, new capacities and new institutions will be needed to meet mitigation and adaptation challenges;

(b) *A collaborative agenda.* Inherent trust among developed and developing countries is a central need in tackling a global challenge: Weak performance on mitigation obligations by high-emitters in the North, combined with minimal operational support for technology and finance, has resulted in a large trust deficit. This must change, as solving the climate problem without participation of the South is no longer possible. This collaboration requires a consistent focus on a fairer world order and a system of global governance that is open, transparent, participatory and responsible;

(c) *A commitment to phasing out high-carbon growth.* "Dirty" subsidies have been estimated at $250 billion (or 0.5 per cent of gross world product) in 2005. Redirecting these to clean energy sources — but not at the expense of access to energy services in developing countries — would boost the transition to low-carbon high growth. Moreover, the rights of countries that depend on the extraction of fossil fuels, which have been recognized in the United Nations Framework Convention on Climate Change, should be an important determinant of the policies chosen.

New financing mechanisms

The difficulty of access to appropriate and predictable levels of finance, at an acceptable cost, has been a consistently binding constraint on investment and growth in poor countries. While the estimates for meeting the mitigation and adaptation challenge cover a wide range, the figures suggested earlier will pose a major obstacle to climate progress in many developing countries. Currently, the financing needed to meet the climate challenge that is available to developing countries from bilateral and multilateral sources is estimated at about $21 billion. That amount will have to rise 10-fold over the next 10 years and perhaps as much as 50-fold by 2050. This is a daunting challenge.

If private investment is to fulfil its role, predictable long-term signals will need to be established based on the price of carbon, using a combination of taxation, emissions trading and regulation. However, the limited evolution of carbon markets and the current financial crisis will discourage private investment flows in the short and medium term at a most critical time, since new infrastructure projects will be producing emissions for decades. Resource mobilization for public investment, from both national and international sources, needs to be pursued more vigorously, and on a much larger scale.

Funding of the large public investments required to meet the challenge, particularly with respect to mitigation, where the front-loading of investments is essential, is unlikely to come through ODA even if donor countries live up to their commitments. Utilization of new funding sources, such as "government green bonds" and "green special drawing rights (SDRs)" from the International Monetary Fund, needs to be considered. Global levies or taxes on bunker fuel for air and ship transport, air travel or financial transactions will also have a role. However, administrative obstacles and concerns about their possibly regressive nature have still to be addressed.

It is widely understood that there is need for an enhanced financial mechanism to deal with the massiveness of the scale of the transfers required for mitigation and adaptation in developing countries. There remains considerable disagreement, however, regarding whether new institutional arrangements, including funds, are needed, or existing arrangements and funds, suitably reformed and scaled up, would suffice. Concerning the governance of such a mechanism, the crucial question is *who will decide what* with respect to the management and allocation of financial resources.

Funding the incremental costs of adaptation will, in most cases, be linked to development-related funding, for example, for infrastructure investment and diversification efforts in developing countries. The closeness of the link may partly explain why institutions like the World Bank have set up their own climate funds.

The scale of such funding remains woefully inadequate and scaling up is an urgent challenge.

The scale of the financing needed to make the big push to a low-carbon development pathway is several orders of magnitude greater than that available through current financing arrangements. Financing the mitigation challenge might therefore warrant making more radical changes in the existing international architecture. Some possible measures include:

(a) *A global clean energy fund*. In light of the urgency of this challenge, a new global fund to address climate change mitigation in developing countries, established outside the existing multilateral financing institutions and with a governance structure acceptable to all parties to the United Nations Framework Convention on Climate Change, needs to be considered. In time, existing mitigation funds could become part of this larger mechanism;

(b) *A global feed-in tariff regime*. A global feed-in tariff programme could provide guaranteed purchase prices to producers of renewable energy in developing countries over the next two decades. This mechanism would lead to an automatic drawdown of subsidies over time as production and incomes increase. Delivery mechanisms would have to be carefully designed so as to ensure a level playing field for all competing technologies and on-grid and off-grid operators and benefit targeted low-income consumers. The programme should be accompanied by provision of support to local renewable components industries to ensure that national production capacities are spurred and countries are able to satisfy a growing share of the increased demand for renewable energy locally, thereby benefiting from additional job creation;

(c) *A reformed Clean Development Mechanism*. The United Nations Framework Convention on Climate Change secretariat estimates that, by 2020, offsetting could yield up to $40.8 billion per year, although this is still only a fraction of estimated incremental costs in developing countries.[5] The present deficiencies of the Clean Development Mechanism for facilitating large-scale resource transfers are widely acknowledged. Much attention has been focused on reforming the Mechanism in such a way as to replace its project focus with a programmatic and/or policy focus, in the expectation of larger impacts, shorter funding cycles and lower transaction costs;

(d) *Forest-related financing mechanisms*. Forestry accounts for about 17 per cent of global greenhouse gas emissions. Several new financing initiatives have been launched to help reduce emissions from deforestation and forest degradation, including the World Bank Forest Carbon Partnership Facility and the United Nations Collaborative Programme on Reducing Emissions from Deforestation and Forest Degradation in Developing Countries (UN-REDD Programme). Sustainable forest management is the right approach to dealing with mitigation in the forest sector as well as other forest sector challenges; financing should enable not only climate change mitigation but also adaptation.

[5] Andrew Pendleton and Simon Retallack, "Fairness in global climate change finance" (London, Institute for Public Policy Research, March 2009), available from http://www.indiaenvironmentportal.org.in/files/Mar09-fairness_global_finance.pdf.

Technology transfer

Existing best-practice technologies for a low-carbon economy are already in place in advanced economies and further breakthroughs are likely. Technology transfer is therefore a critical international public policy issue. At the same time, developing countries will need support in building their own technological capacity so as to ensure that they both undergo a smooth transition to a low-carbon economy and maintain competitiveness in an open global economy. The supporting architecture for dealing with these dimensions of the challenge is still poorly developed and in need of urgent attention focused on:

(a) *A climate technology programme*. An operational programme, supported by a secretariat and various panels of experts, needs to be established, possibly under the auspices of the Conference of the Parties to the United Nations Framework Convention on Climate Change to examine the various dimensions of the technology challenge in developing countries and, where appropriate, to provide technical assistance with respect to, inter alia, energy efficiency in buildings; greening industrial supply chains; deployment and maintenance of renewable energy infrastructure; integrated waste management; water and sanitation; and extension services to promote sustainable agriculture;

(b) *A global research, development and deployment fund*. Current trends have not been favourable for technology development and demonstration. Public expenditures in countries members of the Organization for Economic Cooperation and Development (OECD) on energy-related research, development and deployment have declined to some $8 billion from about $12 billion two decades ago, while private expenditures have declined to $4.5 billion compared with almost $8 billion a decade ago. This means that in the world today we are investing barely about $2 per person per year in energy-related research, development and deployment activities. This needs to increase by a factor of 2 to 3 in order to enable the transition towards new and advanced technologies in energy systems. Given the interrelated threats of climate change and food security, special attention may need to be given to the challenges facing agriculture in the developing world in the context of the green revolution;

(c) *A balanced intellectual property regime for technology transfer*. The parties to the United Nations Framework Convention on Climate Change need to agree to measures that facilitate transfer of technology. There are several flexibilities available within the framework of the Agreement on Trade-related Aspects of Intellectual Property Rights[6] such as compulsory licences, exceptions to patents rights, regulating voluntary licences, and strict application of patentability criteria. These measures may enable access to technologies to a certain degree but their use is limited to specific circumstances and they are usually more difficult to operationalize in developing countries. Options such as allowing developing countries to exclude critical sectors from patenting, as well as a global technology pool for climate change, merit serious consideration, as these options would provide certainty and predictability in accessing technologies and further enable much-needed research and development for local adaptation and diffusion, which would

[6] See *Legal Instruments Embodying the Results of the Uruguay Round of Multilateral Trade Negotiations, done at Marrakesh on 15 April 1994* (GATT secretariat publication, Sales No. GATT/1994-7).

further reduce the cost of the technologies. In addition, modalities for access to publicly funded technologies by developing-country firms need to be explored.

Trade

Serious discussion of the links between trade and climate change has been stymied by the impasse in the Doha Round of negotiations. As Governments are becoming serious about addressing climate change, the old trade and environment debates on how to distinguish between legitimate environmental and health protection measures as allowed under the rules of the World Trade Organization and disguised trade protectionism measures need to be revived.

Trade is important because environmental technologies and know-how are generated primarily in developed countries and transferred to developing countries mainly through embodied technologies in imported goods and services, FDI or licensing. If Governments of Annex I countries should choose to pursue border measures (for example, border tax adjustments) to protect their energy-intensive industries based on the carbon directly and indirectly emitted in the production of a product, it would become necessary to address the unresolved issue of how to treat processes and production methods. Because subsidies are and will continue to be used to support the development of alternative energies, the issue of determining how to handle those subsidies and which ones are non-actionable under the rules of the World Trade Organization will also have to be dealt with.

Last but not least, these issues need to be resolved taking into account the principle of common and differentiated responsibilities as embodied in the United Nations Framework Convention on Climate Change and its equivalent within the framework of the World Trade Organization, namely, special and differentiated treatment for developing countries. If these issues are not resolved adequately, they may result in protracted trade disputes.